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Description

The invention relates to a blind rivet, and in particular to a blind rivet for anchoring in a relatively soft material, for example softwood, as specified in the preamble of claim 1.

Blind rivets, which are installed or placed by access to one side only of the workpieces, have been known and used for many years for use in applications in which the rivet protrudes from the blind or inaccessible side of two or more superposed sheets, and forms a blind head behind the blind face of the rear sheet (FR-A-1316051). However there is also a requirement to secure a member to a body of relatively soft material, e.g. softwood, in such a way that neither the rivet, nor the hole in which it is inserted, breaks through the blind face of the body of relatively soft material.

Such an application raises different problems. The enlarged blind head must be formed by the rivet, inside the body of relatively soft material, in such a way that the engagement of the blind head within the material is sufficiently strong to resist pull-out.

The invention provides, in one of its aspects, a blind rivet for anchoring in relatively soft material, which rivet comprises:-

a tubular shell and a stem;

a preformed head at one end of the shank; and a weakened expandible portion of the shank at the end thereof remote from the head;

the weakened portion of the shell having a thinner wall than the next adjacent part of the shell and a plurality of weakened zones spaced apart circumferemtially around the thinner wall;

and a stem extending through the tubular shell, the stem having:

an expander head adjacent the expandible portion of the shell, the expander head having a maximum external diameter greater than the internal diameter of the thinner wall portion of the shell and having an underhead shape progressively increasing in diameter towards the maximum diameter of the head at least from the radius at which it meets the adjacent end of the shell;

and a breakneck on the stem;

such that when the rivet is inserted into a bore in a body of relatively soft material so that the expandible portion of the shell is located in the bore by a sufficient distance from the surface of the material at accessible end of the bore, and increasing tension is applied to the stem on the side of the breakneck remote from the stem head, with respect to the head of the shell,

firstly the stem head progressively enters the weakened portion of the shell, the progressively increasing diameter of the underhead shape causing the weakened portion to rupture along the weakened zones to split into a plurality of legs which are forced outwardly into the body of relatively soft material to anchor the rivet therein,

and thereafter the stem breakneck fractures before the stem head can advance substantially further into the shell, thereby confining the splitting of the shell into radially expanded legs embedded in the material to the end portion of the shell spaced away from the surface of the material at the accessible end of the bore, with no substantial expansion of at least the major part of the remaining length of the shell shank.

A specific embodiment of the invention will now be described by way of example and with reference to the accompanying drawings, in which:-

Figure 1 is a longitudinal axial section through a rivet shell before assembly;

Figure 2 is a tail end elevation of the shell in the direction of the arrow 2 in Figure 1;

Figure 3 is an external elevation of the rivet stem before assembly;

Figure 4 shows the assembled rivet with the shell in axial section and the stem in elevation;

Figure 5 is an elevation of the rivet placed in a softwood panel; and

Figure 6 illustrates two rivets used to secure a softwood panel to a frame-member.

Referring first to Figure 6, a softwood panel 11 is secured to a metal channel-section frame member 12 by means of a number of rivets, two of which are shown, after placing, at 13. It is a requirement that the face 36 of the softwood panel 11 which is remote from the frame member 12 is not distorted or broken by the riveting operation.

The rivet of this example comprises a shell 14 and a stem 15, both of steel. Figures 1 and 2 show the shell, which is tubular with a bore 16 completely through it, and comprises a shank 17 having a preformed head 18 at one end and a weakened portion 19 at the other, or tail, end. The external diameter of the shank is uniform, the weakened portion 19 having a thinner wall 21 than that 22 of the remainder, or main part, of the shank which is adjacent to it. The weakened portion meets the remainder of the shank in an annular shoulder 23. The weakened portion 19 also contains further longitudinally weakened zones in the form of four V-section grooves 24, spaced equally at ninety degrees apart around the inside of the thinner shell wall 21. Each groove 24 extends from the tail end face 25 of the shell shank towards, but stopping short of, the annular shoulder 23. The axial extent of the weakened portion 19 is between one quarter and one third of the total length of shell shank 14 excluding the head 18.

The stem 15 is shown in Figure 3 and comprises a pulling portion 26 joined by a breakneck 27 to a plugging portion 28. At the end of the stem remote from the pulling portion 26 is an expander head 29. The pulling portion 26 has a uniform diameter which

is a close sliding fit in the shell bore 16. The major part of the length of the plugging portion 28 comprises a retaining portion 33 which is of uniform diameter slightly greater (in this example, by about 0.13 mm in a diameter of about 2.6 mm) than the uniform internal diameter of the major length part 20 of the shell bore 16. One end of the retaining portion 33 is joined to the breakneck 27 by a taper 34.

The maximum external diameter of the expander head 29, over its short parallel portion 31 of uniform maximum diameter, is greater than the internal diameter of the thinner wall portion 19 of the shell and, in this example, is equal to the uniform external diameter of the shell shank 17 (see Figure 4). The head 29 has an underhead portion 32 the external surface of which is, in elevational section, a smooth arcuate curve. This curve blends smoothly with the surface of the adjacent part of the stem, which is the adjacent end of the retaining portion 33 of the stem. The end of the head has a slightly domed surface 30.

The assembled rivet is shown in Figure 4, the stem having been inserted through the bore of the shell until the inner periphery of the tail end face 25 of the shell shank meets the stem head 29 part of the way up the underhead curved face 32. The free end part of the pulling portion 26 of the stem projects well beyond the head 18 of the shell. The leading part of the retaining portion 33 of the stem has been drawn into about half of the length of the part 20 of the shell bore, producing an interference fit. This interference holds the stem firmly assembled in the shell. The exterior of the corresponding part of the shell shank may have been slightly expanded by this interference fit of the stem portion 33 in part of the bore 20.

The rivet is used, in the usual way for blind rivets, by inserting the shell shank of the assembled rivet into a bore in which it is a close fit, until the underside of the head 18 abuts the near face of the workpiece or members to be joined together. Figure 5 shows the fully placed rivet, where it will be seen that a hole 35 of appropriate diameter has been bored through the superposed frame member 12 and into the softwood panel 11. This hole should be at least long enough to accommodate the length of the assembled rivet, when the underface of the shell head 18 is pressed into contact with the near face of the frame 12. In this example, the blind end of the hole 35 comes near to, but does not break through, the remote or inaccesible face 36 of the panel 11, since it is required that this face is visually unmarked.

The rivet is placed by a blind-rivet placing tool of well-known type. This has an annular anvil which abuts the head 18 of the rivet shell, and stem-gripping and pulling jaws which grip the pulling portion of the stem and apply an increasing tension force to it with respect to the shell head. This stem expander head 29 to progressively enter the weakened portion 19 of the shell. The progressively increasing diameter of the stem head underhead portion 32 exerts a radially outward force on the weakened portion 19 of the shell, which ruptures along the grooves 24 and splits into four legs 37. The legs bend outwardly about their inner ends under the force of the advancing underhead portion 32, and displace and compress the softwood material. The taper 34 on the stem eases the progressive entry of the retaining portion 33 of the stem along the bore. The slightly enlarged retaining portion 33 of the stem axially lengthens its interference fit with the wall of the shell bore. This may cause a very slight radial expansion of the outside of the shell to axially extend towards the shell head. The stem head 29 advances until resistance to the underhead face 32 increases substantially, when it reaches the region of the inner ends of the grooves 24 and the annular shoulder 23, where the shell becomes stronger and much more resistant to rupture and deformation. In addition, the part of the wood 11 surrounding the legs 37, which has been compressed by the legs as they are forced outwardly, resists further outward movement of the legs, which in turn resists further movement of the stem head along the shell. As the tension applied to the stem pulling portion 26 by the rivet placing tool continues to increase, the stem fractures at the breakneck 27, which is by then located inside the shell head 18. The rivet is thus anchored in the softwood panel 11 by means of the outwardly deformed legs 37 which are embedded in the material of the wood, as illustrated in Figure 5.

The stem head and plugging portion are retained within the shell by the interference of the enlarged retaining portion 33 with the adjacent part of the shell shank. The presence of the stem head in abutment with the deformed legs 37 of the shell tail restrains the legs against inward collapse, which would weaken the strength of the riveted joint.

It should be noted that the major anchoring deformation of the legs 37 is spaced well away from the surface of the softwood panel 11 which is in contact with the frame member 12, so that there is plenty of wood material undisturbed adjacent the wall of the hole 35 to be strong enough to resist pull-out of the rivet. This resistance would be reduced by any substantial radial expansion of the part of the shell shank between the legs 37 and the shell head 18, since the amount of material of the softwood which resists pull-out of the expanded legs would be reduced. Any slight expansion of the exterior of the shell shank nearest the weakened portion due to the insertion of the stem retaining portion 33 into the shell bore part 20, has occured on assembly of the rivet, before it is inserted in the hole 35 in the wood. Any axial extension of this slight expansion, when the rivet is installed, has a negligible effect on the resistance to pull-out of the rivet offered by the wood. The disruption of the wood by the legs is also spaced well away from the remote face 36 of the wood panel, thus ensuring that this face

is not disturbed.

It is found that, if the hole 35 is rather shorter than is recommended, so that the stem head end face 30 touches the bottom of the hole and the shell head underface cannot initially touch the frame 12, the action of the legs 37 when the rivet is installed pulls the rivet shell head 18 into contact with the frame 12. This action can also pull the frame into tight contact with the softwood panel 11.

It is also found that there is a substantial tolerance in the diameter of the hole 35 in which the installed rivet will still have a substantial resistance to pull-out.

The invention is not restricted to the details of the foregoing example. For instance, the stem head 29 may be formed without the parallel portion 31, the domed end face 30 being directly adjacent the wider end of the underhead curved face 32.

The weakened zones, provided in the foregoing example by grooves 24, need extend longitudinally only sufficiently far to ensure that the tail portion splits satisfactorily to form legs. The weakened zones would thus initiate splitting, which would then continue beyond the weakened zones. It is possible that weakened zones need not extend longitudinally at all, for example being provided by a plurality of radial grooves on the end face 25 of the shell, provided that satisfactory splitting into legs is achieved.

Retention of the stem in the shell of the installed rivet may be achieved by providing a more positive interference between these two parts, e.g. by providing grooves on the stem in which the shell engages.

Claims

1. A blind rivet for anchoring in relatively soft material, which rivet comprises:-

a tubular shell (14) having a shank (17);

a preformed head (18) at one end of the shank;

and a weakened expandible portion (19) of the shank at the end thereof remote from the head;

the weakened portion (19) of the shell having plurality of weakened zones (24) spaced apart circumferentially around it;

and a stem (15) extending through the tubular shell, the stem having:

an expander head (29) adjacent the expandible portion (19) of the shell, the expander head having a maximum external diameter greater than the internal diameter of the weakened wall portion (19) of the shell and having an underhead shape (32) progressively increasing in diameter towards the maximum diameter of the head at least from the radius at which it meets the adjacent end of the shell;

and a breakneck (27) on the stem;

such that when the rivet is inserted into a bore (35) in a body of relatively soft material (11) so that the expandible portion (19) of the shell is located in the bore spaced by a sufficient distance from the surface of the material at the accessible end of the bore, and increasing tension is applied to the stem (15) on the side (26) of the breakneck (27) remote from the stem head, with respect to the head of the shell,

firstly the stem head (29) progressively enters the weakened portion (19) of the shell, the progressively increasing diameter of the underhead shape causing the weakened portion to rupture along the weakened zones (24) to split into a plurality of legs (37) which are forced outwardly into the body of relatively soft material (11) to anchor the rivet therein,

characterised in that the weakened portion (19) of the shell also has a thinner wall (21) than the next adjacent part (22) of the shell, whereby after the stem head (29) has entered the weakened portion (19) of the shell as aforesaid, the stem breakneck (27) fractures before the stem head can advance substantially further into the shell, thereby confining the splitting of the shell into radially expanded legs (37) embedded in the material (11) to the end portion of the shell spaced away from the surface of the material at the accessible end of the bore, with no substantial expansion of at least the major part of the remaining length of the shell shank (17).

2. A rivet as claimed in claim 1, further characterised in that the weakened portion (19) of the shell has the same external diameter as the next adjacent part (22) of the shell.

3. A rivet as claimed in claim 2, further characterised in that the inner end of the weakened portion (19) meets the next adjacent part (22) of the shell at an annular shoulder (23).

4. A rivet as claimed in claim 1 or claim 2, further characterised in that the weakened zones (24) extend longitudinally of the weakened portion (19).

5. A rivet as claimed in claim 4,further characterised in that the longitudinally extending weakened zones (24) stop short of the inner end of the weakened portion.

6. A rivet as claimed in any of the preceding claims, further characterised in that the plurality of longitudinally extending weakened zones comprises a number of grooves (24) in the inside of the thinner wall.

7. A rivet as claimed in claim 6, further characterised in that each groove (24) is of V-section.

8. A rivet as claimed in any of the preceding claims, further characterised in that the shell shank (17) has a uniform external diameter.

9. A rivet as claimed in any of the preceding claims, further characterised in that the underhead shape (32) of the stem head (29) progressively increases in diameter as aforesaid in a smooth arcuate curve.

10. A rivet as claimed in any of the preceding claims, further characterised in that the underhead shape progressively increases as aforesaid from the

diameter of the adjacent part (33) of the stem (15) to the maximum diameter of the head (29).

11. A rivet as claimed in any of the preceding claims further characterised by means (33, 17) for retaining the stem head (29) in engagement with the outwardly deformed legs (37) to restrain them against subsequent inwards collapse.

12. A rivet as claimed in claim 11, further characterised in that the retaining means is provided by part (33) of the stem which has a diameter greater than the initial diameter of the part of the shell bore into which it has been drawn.

13. A rivet as claimed in claim 12, further characterised in that the retaining means part (33) of the stem of greater diameter extends substantially as far as the breakneck (27).

14. A rivet as claimed in claim 13, further characterised in that the retaining means part 33 of the stem is joined to the breakneck (27) by a taper (34).

Patentansprüche

1. Blindniet zur Verankerung in relativ weichem Material mit

einer röhrenförmigen Hülse (14) mit einem Schaft (17);

einem vorgeformten Kopf (18) an einem Ende des Schaftes;

und einem geschwächten ausdehnbaren Abschnitt (19) des Schafts an dem Ende des Schafts, welches von dem Kopf entfernt ist;

wobei der geschwächte Abschnitt (19) der Hülse eine Vielzahl von geschwächten Zonen (24) aufweist, die um den Umfang herum voneinander beabstandet angeordnet sind;

und einem Dorn (15), der sich durch die röhrenförmige Hülse erstreckt, mit:

einem Ausdehnkopf (29), der benachbart zu dem ausdehnbaren Abschnitt (19) der Hülse angeordnet ist, und der einen gröBten Außendurchmesser aufweist, der größer ist als der Innendurchmesser des geschwächten Wandabschnitts (19) der Hülse und der eine Form (32) unter dem Kopf aufweist, die auf den größten Durchmesser des Kopfes hin einen zunehmend wachsenden Durchmesser aufweist, zumindest ausgehend von demjenigen Radius, an dem sie das benachbarte Ende der Hülse berührt;

und eine Sollbruchstelle (27) an dem Dorn;

dergestalt, daß, wenn das Niet in eine Bohrung (35) in einem Körper aus relativ weichem Material (11) eingesetzt ist, so daß der ausdehnbare Abschnitt (19) der Hülse in der Bohrung einen hinreichenden Abstand entfernt von der Oberfläche des Materials an dem zugänglichen Ende der Bohrung liegt, und zunehmende Zugkraft im bezug auf den Kopf der Hülse auf den Dorn (15) auf der Seite (26) der Sollbruchstelle (27) ausgeübt wird, die von dem Dornkopf entfernt ist,

zuerst der Dornkopf (29) fortschreitend in den geschwächten Abschnitt (19) der Hülse eintritt, wobei der fortgesetzt zunehmende Durchmesser der Form unter dem Kopf dazu führt, daß der geschwächte Abschnitt entlang der Schwächungszonen (24) bricht, um sich in eine Vielzahl von Stegen (37) zu teilen, die auswärts in den Körper des relativ weichen Materials (11) geprellt werden, um das Niet darin zu verankern,

dadurch gekennzeichnet, daß der geschwächte Abschnitt (19) der Hülse auch eine dünnere Wand (21) als der nächste benachbarte Teil (22) der Hülse aufweist, wodurch die Sollbruchstelle (27) des Dorns bricht, nachdem der Dornkopf (29) in den geschwächten Abschnitt (19) der Hülse, wie oben beschrieben, eingetreten ist, bevor der Dornkopf wesentlich weiter in die Hülse vordringen kann, wodurch die Teilung der Hülse in radial ausgedehnte Stege (37), die in das Material (11) eingebettet sind, auf den Endabschnitt der Hülse beschränkt wird, der von der Oberfläche des Materials an dem zugänglichen Ende der Bohrung entfernt ist, während keine wesentliche Ausdehnung von zumindest dem größeren Teil der verbleibenden Länge des Hülsenschaftes (17) erfolgt.

2. Niet nach Anspruch 1, dadurch gekennzeichnet, daß der geschwächte Abschnitt (19) der Hülse den gleichen Außendurchmesser aufweist, wie der nächste benachbarte Teil (22) der Hülse.

3. Niet nach Anspruch 2, dadurch gekennzeichnet, daß das innere Ende des geschwächten Abschnitts (19) an einer ringförmigen Schulter (23) mit dem nächst benachbarten Teil (22) zusammentrifft.

4. Niet nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß die geschwächten Zonen (24) sich längs des geschwächten Abschnittes (19) erstrecken.

5. Niet nach Anspruch 4, dadurch gekennzeichnet, daß die sich längs erstreckenden geschwächten Zonen (24) kurz vor dem inneren Ende des geschwächten Abschnitts aufhören.

6. Niet nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Vielzahl von sich längs erstreckenden geschwächten Zonen eine Anzahl Nuten (24) an der Innenseite der dünneren Wand umfassen.

7. Niet nach Anspruch 6, dadurch gekennzeichnet, daß jede Nut (24) einen V-förmigen Querschnitt aufweist.

8. Niet nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß der Schaft (17) der Hülse einen einheitlichen Außendurchmesser aufweist.

9. Niet nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß die Form (32) unter dem Kopf des Hülsenkopfes (29) in ihrem Durchmesser fortlaufend zunimmt, wie oben beschrieben, und in einer weich gebogenen Kurve.

10. Niet nach einem der vorhergehenden Ansprü-

che, dadurch gekennzeichnet, daß die Form unter dem Kopf wie vorher beschrieben fortlaufend zunimmt von dem Durchmesser des benachbarten Teils (33) des Dorns (15) zu dem größten Durchmesser des Kopfes (29).

11. Niet nach einem der vorhergehenden Ansprüche, gekennzeichnet durch eine Vorrichtung (33, 17) zum Festhalten des Dornkopfes (29) in Eingriff mit den nach auswärts verformten Stegen (37), um einen folgernden Einwärtskollaps dieser Stege zu verhindern.

12. Niet nach Anspruch 11, dadurch gekennzeichnet, daß die Festhaltevorrichtung durch einen Teil (33) des Dorns gebildet wird, der einen Durchmesser aufweist, der größer ist als der anfängliche Durchmesser des Teils der Hülsenbohrung, in den er eingezogen worden ist.

13. Niet nach Anspruch 12, dadurch gekennzeichnet, daß das Festhaltevorrichtungsteil (33) des Dorns mit größerem Durchmesser sich im wesentlichen bis zur Sollbruchstelle (27) erstreckt.

14. Niet nach Anspruch 13, dadurch gekennzeichnet, daß das Festhaltevorrichtungsteil (33) des Dorns mit der Sollbruchstelle (27) durch eine Verjüngung (34) verbunden ist.

Revendications

1. Un rivet aveugle destiné à être ancré dans un matériau relativement tendre, ce rivet comportant :

un manchon cylindrique tubulaire (14) comprenant une tige (17) ;

une tête préformée (18) à une extrémité de la tige ;

et une partie extensible affaiblie (19) de la tige à l'extrémité de celle-ci éloignée de la tête ;

la partie affaiblie (19) du manchon cylindrique présentant sur sa périphérie une pluralité de zones affaiblies (24) espacées les unes des autres ;

et une broche (15) s'étendant à travers le manchon cylindrique tubulaire, cette tige possédant :

une tête d'élargissement (29) adjacente à la partie extensible (19) du manchon cylindrique, la tête d'élargissement présentant un diamètre externe maximal plus grand que le diamètre interne de la partie de paroi affaiblie (19) du manchon cylindrique et présentant un col évasé (32) dont le diamètre augmente progressivement vers le diamètre maximum de la tête au moins à partir de la zone radiale au niveau de laquelle elle rencontre l'extrémité adjacente du manchon cylindrique ;

et un rétreint de rupture (27) prévu sur la broche ;

si bien que, lorsque le rivet est inséré dans un alésage (35) prévu dans un élément en un matériau relativement tendre (11) de telle façon que la partie extensible (19) du corps tubulaire est disposée à l'intérieur de l'alésage et espacée d'une distance suffisante de la surface du matériau au niveau de l'extrémité accessible de l'alésage, et lorsqu'une tension croissante est appliquée à la broche (15), du côté (26) du rétreint de rupture (27) qui est opposé à la tête de broche, par rapport à la tête du manchon cylindrique, la tête de broche (29) entre d'abord, de façon progressive, dans la partie affaiblie (19) du manchon cylindrique, le diamètre, qui croit de façon progressive, de la zone évasée provoquant la rupture de la partie affaiblie, selon les zones affaiblies (24), de façon à fendre celle-ci en une pluralité de pattes (37) qui viennent s'enfoncerr vers l'extérieur dans la masse du matériau relativenent tendre (11) afin d'y ancrer le rivet.

caractérisé en ce que la partie affaiblie (19) du manchon cylindrique présente également une paroi plus mince (21) que la partie voisine adjacente (22) du manchon cylindrique, ce qui fait qu'après que la tête de broche (29) a pénétré dans la partie affaiblie (19) du corps cylindrique comme spécifié ci-dessus, le rétreint de rupture (27) de la tige se rompt avant que la tête de broche puisse pénétrer sensiblement plus loin dans le manchon cylindrique, en limitant ainsi le fendage du manchon cylindrique à des pattes (37) s'écartant radialement, qui s'encastrent dans le matériau (11) au niveau de la partie terminale du manchon cylindrique qui est éloignée de la surface du matériau au niveau de l'extrémité accessible de l'alésage, sans que se produise d'élargissement sensible d'au moins la partie principale de la longueur restante de la tige (17) du manchon cylindrique.

2. Un rivet tel que revendiqué dans la revendication 1, caractérisé en outre en ce que la partie affaiblie (19) du manchon cylindrique présente le même diamètre externe que la partie voisine adjacente (22) du manchon cylindrique.

3. Un rivet tel que revendiqué dans la revendication 2, caractérisé en outre en ce que l'extrémité interne de la partie affaiblie (19) rencontre la partie voisine adjacente (22) du manchon cylindrique au niveau d'un épaulement annulaire (23).

4. Un rivet tel que revendiqué dans la revendication 1 ou la revendication 2, caractérisé en outre en ce que les zones affaiblies (24) s'étendent longitudinalement à la partie affaiblie (19).

5. Un rivet tel que revendiqué dans la revendication 4, caractérisé en outre en ce que les zones affaiblies s'étendant longitudinalement (24) s'arrêtent au-dessous de l'extrémité interne de la partie affaiblie.

6. Un rivet tel que revendiqué dans l'une quelconque des revendications précédentes, caractérisé en outre en ce que la pluralité de zones affaiblies s'étendant longitudinalement comprend un certain nombre de rainures (24) ménagées à l'intérieur de la paroi amincie.

7. Un rivet tel que revendiqué dans la revendication 6, caractérisé en outre en ce que chaque rainure

(24) présente une section en V.

8. Un rivet tel que revendiqué dans l'une quelconque des revendications précédentes, caractérisé en outre en ce que la tige tubulaire (17) présente un diamètre extérieur uniforme.

9. Un rivet tel que revendiqué dans l'une quelconque des revendications précédentes, caractérisé en outre en ce que le col évasé (32) de la tête de broche (29) s'accroît progressivement en diamètre, comme spécifié ci-dessus, selon une courbe doucement incurvée.

10. Un rivet tel que revendiqué dans l'une quelconque des revendications précédentes, caractérisé en outre en ce que le col évasé s'accroît progressivement, comme spécifié ci-dessus, à partir du diamètre de la partie adjacente (33) de la broche (15) jusqu'au diamètre maximum de la tête (29).

11. Un rivet tel que revendiqué dans l'une quelconque des revendications précédentes, caractérisé en outre par des moyens (33, 17) pour retenir la tête de broche (29) en engagement avec les pattes (37) déformées vers l'extérieur afin de leur éviter d'être rabattues vers l'intérieur par la suite.

12. Un rivet tel que revendiqué dans la revendication 11, caractérisé en outre en ce que les moyens de rétention sont constitués par la partie (33) de la broche qui présente un diamètre plus grand que le diamètre initial de la partie de l'alésage du manchon cylindrique, dans laquelle elle a été enfoncée.

13. Un rivet tel que revendiqué dans la revendication 12, caractérisé en outre en ce que la partie (33) des moyens de rétention de la broche de plus grand diamètre s'étend pratiquement aussi loin que le rétreint de rupture (27).

14. Un rivet tel que revendiqué dans la revendication 13, caractérisé en outre en ce que la partie (33) des moyens de rétention de la broche est reliée au rétreint de rupture (27) par une partie conique (34).

Fig.1.

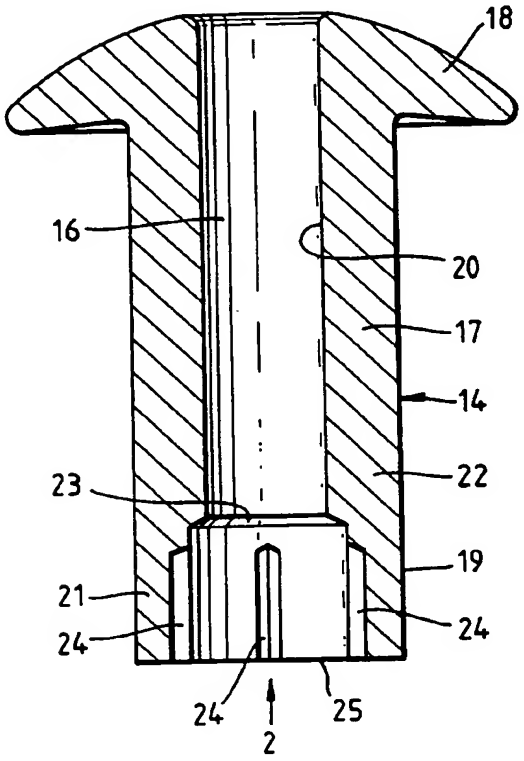

Fig.2.

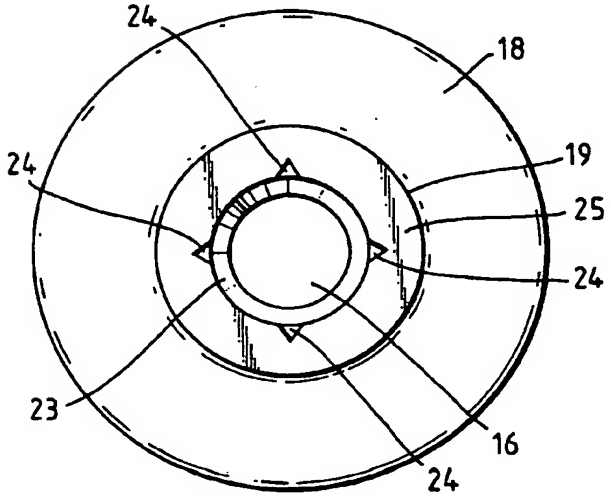

Fig.3.

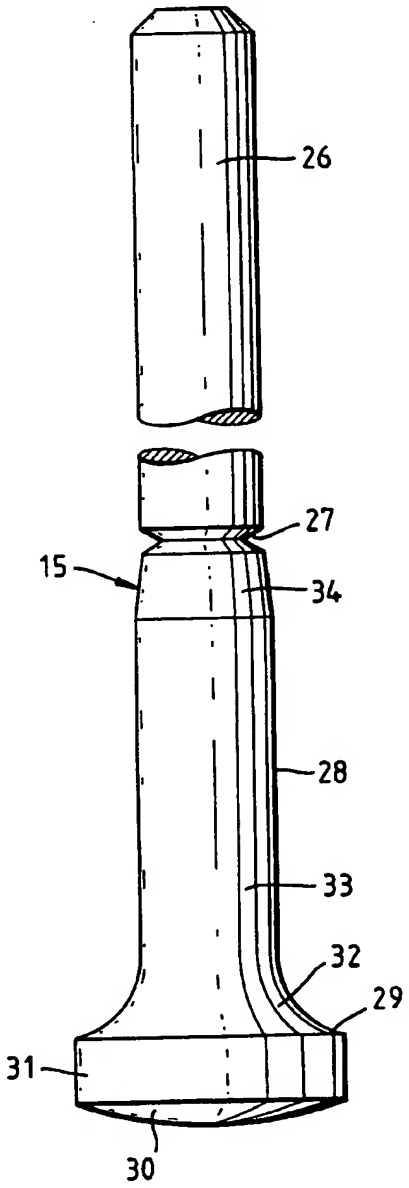

Fig. 4.

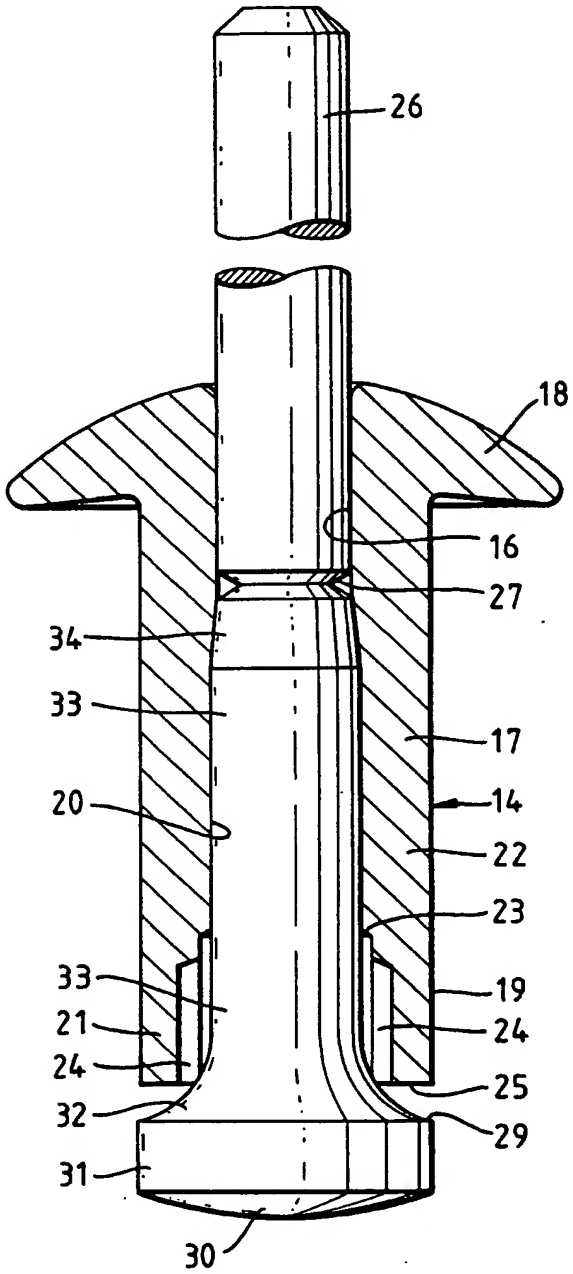

Fig.5.

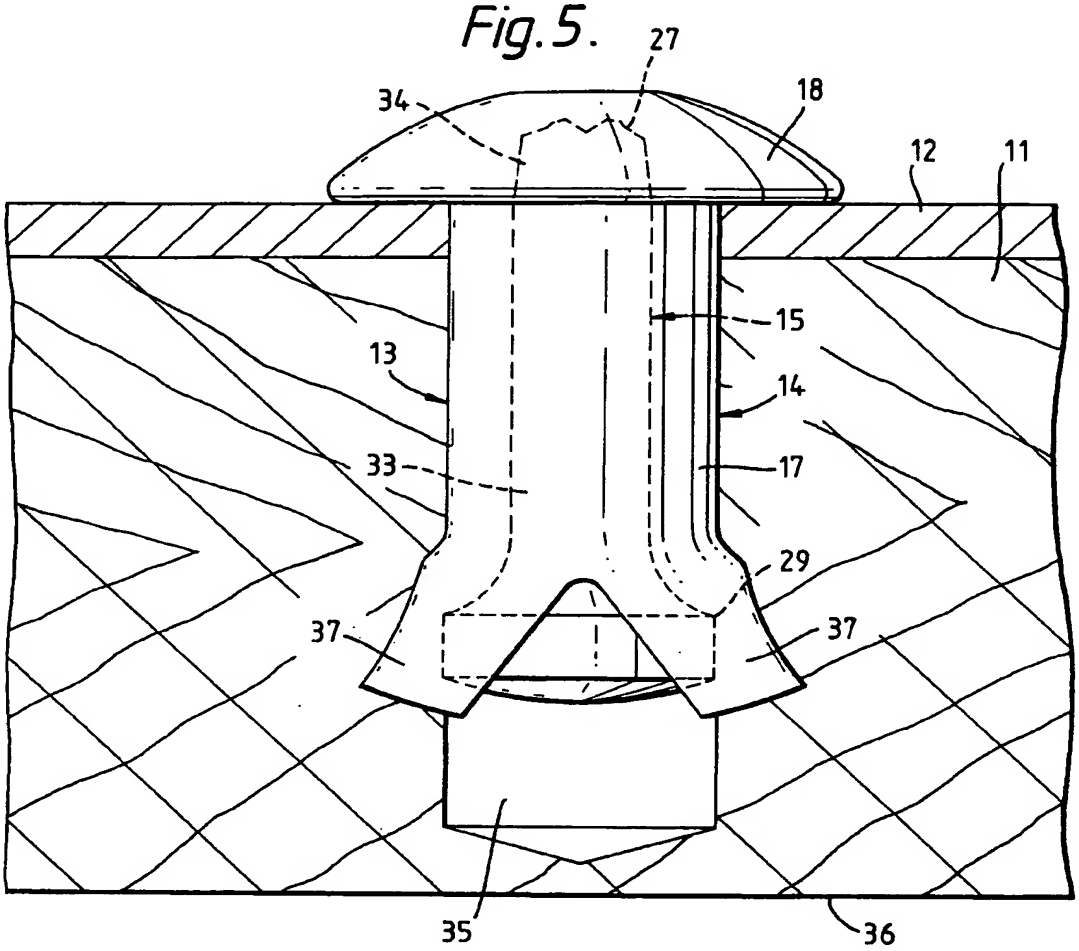

Fig.6.